Claims 1 through 16 are pending, with Claims 1 and 12 being independent. Claims 1 through 11 were withdrawn from consideration. Claims 12 through 16 have been amended. The specification has been amended.

The drawings were objected to under 37 C.F.R. § 1.83(a) on the grounds that the gate for a resin material in a completed optical scale is not shown. All objections are respectfully traversed. Applicants respectfully note that the claims (i.e., Claims 13 and 14) have been amended to recite --a gate for injecting the resin material during molding--, and respectfully submit that such is shown, e.g., in Fig. 1 by item 10.

The title has been amended as required.

Claims 13 and 16 were objected to for informalities. All objections are respectfully traversed and are submitted to have been obviated by the amendment of the claims in a manner respectfully believed to avoid the grounds of objection.

Claims 12 through 16 were variously rejected under 35 U.S.C. §§ 102 and 103 over U.S. Patent Nos. 4,780,610 (Abe), 4,952,799 (Loewen), 6,055,111 (Nomura, et al.), and 5,038,031 (Kurosawa, et al.). All rejections are respectfully traversed.

Claim 12 recites, inter alia, that the shaft holding portion and reflecting portion are integrally molded in a mold by using a transparent resin material, the reflecting portion is constructed so as to reflect an incident light ray by an internal total reflection, and the shaft holding portion and reflecting portion are molded by molding portions arranged on a single surface side of the mold.

However, Applicants respectfully submit that none of Abe, Loewen, Nomura, et al., and Kurosawa, et al., even in the proposed combinations, assuming, arguendo, that the documents could be combined, discloses or suggests at least the above-discussed combination of claimed features as recited, inter alia, in Claim 12. It is further respectfully submitted that there has been no showing of any indication of motivation in the cited documents that would lead one having ordinary skill in the art to arrive at such claimed features. By means of such features, Applicants respectfully submit that an optical scale, in which a center of the shaft holding portion and a center of a reflecting pattern of the reflecting portion precisely coincide with each other, can be obtained; therefore, an accumulative error in detection of a rotating angle of the optical scale can be reduced; furthermore, working for matching the center of the shaft holding portion and a center of the shaft for rotating the optical scale can be omitted, when the shaft is fixed to the optical scale (see, e.g., Fig. 1 where the shaft holding portion 3 and the reflecting portion 7 are molded by molding portions arranged on a single surface side of the mold (fixed platen 8)).

The dependent claims are also submitted to be patentable because they set forth additional aspects of the present invention and are dependent from independent claims discussed above. Therefore, separate and individual consideration of each dependent claim is respectfully requested.

Applicants submit that this application is in condition for allowance, and a Notice of Allowance is respectfully requested.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our address listed below.

Respectfully submitted,

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MARKED-UP CLAIM SHEET

12. (Amended) An optical scale having a reflecting portion for reflecting light emitted from a light-emitting portion of a sensor having the light-emitting portion and a light-receiving portion and returning the light to the light-receiving portion,

wherein a shaft holding portion of [the] said optical scale which holds a shaft for rotating [the] said optical scale and [the] said reflecting portion are integrally molded in a mold by using a transparent resin material, said reflecting portion is constructed so as to reflect an incident light ray by an internal total reflection, and said shaft holding portion and said reflecting portion are [formed on] molded by molding portions arranged on a single surface side of the [optical scale] mold.

13. (Amended) [The] A scale according to claim 12, wherein said shaft holding portion has a closed-end concave portion fitted on the shaft for [rotting] rotating said optical scale, and a gate for [a] injecting the resin material during molding is disposed in the closed-end concave portion.

14. (Amended) [The] A scale according to claim 12, wherein said shaft holding portion has a convex portion to be fitted to the shaft for rotating said optical scale, and a gate for [a] injecting the resin material during molding is disposed at the convex portion.

15. (Amended) [The] A scale according to claim 12, wherein said shaft holding portion is coupled to a bearing inner ring portion for rotatably holding said optical scale.

16. (Amended) An optical encoder using said optical scale defined in claim 12, [wherein said sensor is disposed on the same holding member as that for said bearing for rotatably supporting said optical scale] comprising:

a bearing for rotatably supporting said optical scale; and

a holding member for holding said bearing and the sensor.

VERSION SHOWING CHANGES MADE TO THE SPECIFICATION

Please substitute the following paragraph for the paragraph starting at page 2, line 14 and ending at page 3, line 5. A marked-up copy of this paragraph, showing the changes made thereto is attached.

Each scale described above is indirectly coupled to the coupling portion of a rotating shaft through a hub member[,]; it is difficult to fix the scale to the shaft while maintaining high eccentricity precision between the center of the slit portion formed in the scale and the rotating shaft. This requires high-precision adjustment. Likewise, owing to the above arrangement, it is difficult to keep high squareness precision between the scale and the rotating shaft in the presence of wobbling of the scale surface upon rotation. Furthermore, since a metal scale or film scale has a thickness of 0.2 mm or less, it exhibits poor flatness. As a consequence, the scale suffers from large wobbling (flapping) of the surface. This becomes a factor that causes a deterioration in angle detection precision. It is relatively easy for a glass scale, from which relatively high flatness can be obtained, to improve squareness precision. However, this scale is susceptible to shock, and expensive.